

The Weathervane

Fall 2008
Edition

A newsletter for the stakeholders of the National Weather Service, Greenville-Spartanburg, including the general public and the emergency services community



National Weather Service, Greenville-Spartanburg, SC

WFO Greenville-Spartanburg's Performance in FY-2008

Larry Gabric
Meteorologist in Charge

As measured by National Weather Service performance goals, WFO Greenville-Spartanburg had a very good year in Fiscal Year 2008. First, let me provide a little history. In 1993, Congress enacted the Government Performance and Results Act, commonly known as GPRA. This legislation was the foundation of the most fundamental reform of the federal government in decades. For the first time, federal agencies were mandated to become specifically results-oriented. Under GPRA, they are required to develop long-term Strategic Plans defining general goals and objectives for their programs, to develop Annual Performance Plans specifying measurable performance goals for all of the program activities in their budgets, and to publish an Annual Performance Report showing actual results compared to each annual performance goal. The Annual Performance Plan goals should show the expected progress toward meeting the long-term goals of the Strategic Plan, and both plans must describe the strategies and various resources needed to meet their goals.

METRIC	FY08 GOALS	GSP
TORNADO POD	0.67	0.69
TORNADO FAR	0.74	0.75
TORNADO LT	11	14
FLASH FLOOD POD	0.90	0.90
FLASH FLOOD LT	49	28
WINTER STORM POD	0.90	1.00
WINTER STORM LT (hours)	15	19.5
AVIATION IFR POD	0.63	0.65
AVIATION IFR FAR	0.44	0.30
SEVERE TSTM POD	0.80	0.90
SEVERE TSTM FAR	0.34	0.30
SEVERE TSTM LT	16	23
WINTER STORM FAR	0.33	0.40
FLASH FLOOD LT > 0	80	.95
RIVER FLOOD POD	0.82	1.00
WSR-88D (RADAR) AVAILABILITY	99	1.00

Figure 1: In the table above, **POD** means Probability of Detection. The higher that number, the better. **FAR** means False Alarm Ratio. We want a low false alarm rate. **LT** means lead time. That's how much time, in minutes, elapses between a warning and a severe event. The higher the lead time, the better.

In this context, the National Weather Service has developed performance goals. Our 2008 goals and results are listed in the table. The black are national goals that we contribute

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Tornadoes strike Clemson University. See story on page 7.

toward while the purple are regional goals.

As you can see from the chart, WFO Greenville-Spartanburg did very well in FY-2008. Of these 16 program goals, the office hit 13 of them for an 81% success rate. The only ones that were missed

were tornado false alarm by .01, winter storm false alarm by .07 and flash flood lead time. In order to obtain this number of goals, it takes a sustained level of high performance. If one large event is missed, it could negatively affect the statistics for the entire year.

Of course, we can not rest on our laurels. The new fiscal year has already begun. However as always, we will endeavor to provide the best service possible throughout the year to the residents of northeast Georgia, upstate South Carolina and western North Carolina. ▣

Flood Warning Services For Mecklenburg County

Chris Horne, Meteorologist and Hydrology Focal Point

To address the need for flood warning services on a scale smaller than just mainstem rivers, the National Weather Service (NWS) implemented the Flash Flood Program in 1970. This program provides flood warning services for counties and portions of counties which include faster responding creeks, streams and urban areas. Warnings issued by the local Weather Service Office are accomplished by using a variety of

decision aiding sources including radar derived rainfall estimates, rain and stream gauge data, flash flood guidance values, various computer applications and the knowledge of the warning meteorologist.

A sizeable portion of this gauge network is collectively installed and maintained by the United States Geological Society (USGS) and Charlotte-Mecklenburg Storm Water Services across greater Charlotte.

Data from more than 70 rain gauges and 50+ stream gauges across Mecklenburg County and adjacent areas is automatically collected at 15 minute intervals and transmitted via radio or satellite telemetry to numerous users at the local, county, state and federal levels.

We here at the NWS are able to monitor

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Figure 2: A typical rain gauge installation consisting of tipping bucket, communication equipment, solar panel and radio antenna. This gauge is located on the roof of Odell Elementary School.



Figure 3: A typical stream gauging station. This gage is located along Briar Creek above Shamrock Drive.

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this near real-time flow of data to make critical flood and flash flood warning decisions, often with greater advanced notice, and for specific stream basins or watersheds, based on the observed and future rainfall.

In addition to NWS warnings, by monitoring rainfall and stream levels, local emergency personnel are able to provide a faster response to, and the possible mitigation of, flood-related problems. ■

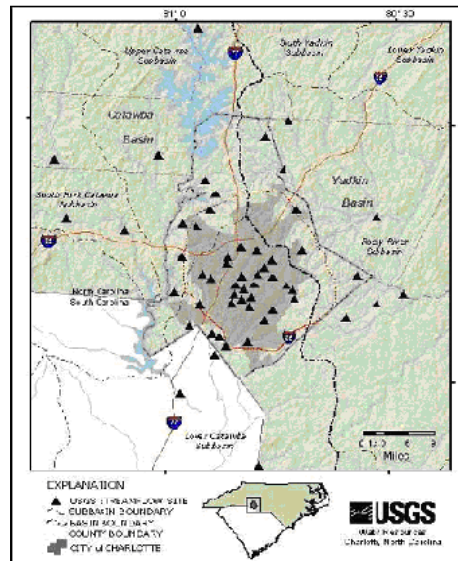


Figure 4: The Charlotte/Mecklenburg Streamflow Gauge Network map.

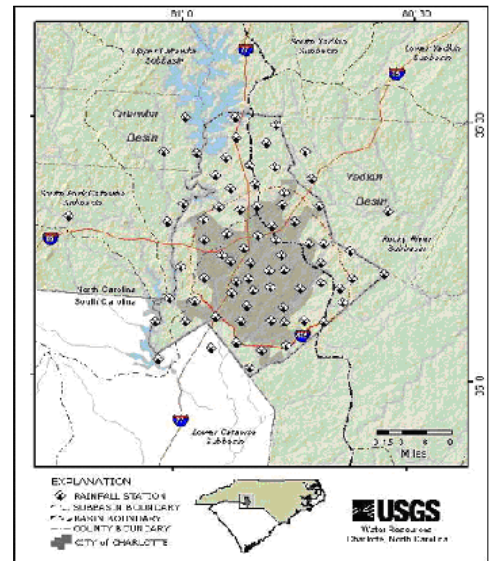


Figure 5: The Charlotte/Mecklenburg rainfall network gauge locations.

Winter Weather Product Changes for the 2008-2009 Winter Season

Harry Gerapetritis
Senior Forecaster

The National Weather Service has simplified the suite of Winter Weather Warnings and Advisories for the upcoming winter season. Forecasters will now issue all winter warning products using one of four categories:

Ice Storm Warning – issued when damaging or dangerous accumulations of ice (generally ¼ inch or more) are expected on trees, power lines, or roadways.

Blizzard Warning – issued when sustained winds, or frequent gusts greater than or equal to 35 mph, are accompanied by falling and/or blowing snow reducing visibility to less than ¼ mile for 3 hours or more.

Winter Storm Warning – used to cover all other heavy winter weather precipitation

events. This includes heavy snow accumulating 3 inches or more in a 12-hour period, or 4 inches or more in a 24-hour period; sleet accumulations of ½ inch or more; and mixed snow, sleet, and ice events in which combined accumulations produce a hazard to life or property.

Wind Chill Warning – issued when wind chill temperatures reach or exceed minus 20 degrees Fahrenheit in the mountains, or minus 15 degrees outside of the mountains.

Likewise, Winter Weather Advisories will be limited to:

Freezing Rain Advisory – issued for light ice accumulations (from freezing rain or freezing drizzle) totaling from a trace to less than ¼ inch.

Winter Weather Advisory – issued when a

hazardous winter weather event produces either light snow accumulations of at least one inch, but less than three inches; light sleet accumulations totaling less than ½ inch; snow and blowing snow with gusty winds of 25 to 35 mph and visibilities reduced to ¼ mile or less; or, any combination of winter events which could become hazardous.

Wind Chill Advisory – issued for wind chill temperatures reaching or exceeding minus 5 degrees Fahrenheit in the mountains, or zero degrees Fahrenheit outside of the mountains.

This simplification in Winter Weather Hazards will allow winter products to be created and collaborated more efficiently, and also permit our partners in the broadcast media to more easily convey these hazards to the public. ■

New Climate Database Operational

John Tomko
Climate Program Manager

New climate databases have been implemented for the Asheville, Charlotte and Greenville-Spartanburg metropolitan areas. This extends the period of record back to 1902 at Asheville, and back to 1893 at Greenville-Spartanburg. The Charlotte record goes back to 1878. One thing to note about Charlotte is that the climate record now switches from the downtown site to the airport location in 1948. Previously, this switch occurred in 1939. This change allows for a more complete climate record at Charlotte.

Over the years, the location where weather observations are taken in a metropolitan area will change, often

several times. Threadex, which stands for Threaded Extremes, is a collaborative project undertaken by the National Climatic Data Center, the National Weather Service, the Northeast Regional Climate Center, and various state climatologists, to piece the data from these different observing locations into a single, long term set of climate data for an area. This has greatly increased the period of record at some of our climate sites.

This also makes the data compatible with the electronic database known as the Applied Climate Information System (ACIS). ACIS is in turn used by NOWDATA, which is the database engine that retrieves climate information on our local

climate web page.

Among the highlights of the newly threaded data is the addition of a 15 inch snowstorm in February of 1902 to the Greenville-Spartanburg climate record and an 8 degree high temperature in November of 1950 at Asheville. Not all the old compiled lists of records have been updated on the web page, but this will occur as local research is conducted.

■

Climate information for Greenville-Spartanburg, Charlotte and Asheville can be found on the climate section of our web page at:
<http://www.weather.gov/climate/index.php?wfo=gsp>

New Fire Weather Tools for Smoke and Fog

John Tomko
Fire Weather Program Leader

Since mid October, the National Weather Service at Greenville-Spartanburg has been including the Atmospheric Dispersion Index (ADI) and Low Visibility Occurrence Risk Index (LVORI) in its Fire Weather Planning Forecast, and Fire Point Forecast Matrix Forecast.

Dispersion has historically been calculated in the Carolinas using nighttime surface wind speeds, with each state having its own dispersion categories based on a range of speeds. The (ADI), sometimes referred to as

Lavdas, after its author, is a more robust tool, utilizing solar angle, cloud cover, and wind speed to determine a stability class, and then adding mixing height information to determine dispersion. The greater the ADI number, the greater the dispersion. Values of ADI can run from the single digits at night, to over 100 during the day, although typical daytime values are between 40 and 100.

For some time, land management agencies in the Carolinas have requested more information on the possibility of fog formation at night. Low visibility from smoke induced fogs can contribute

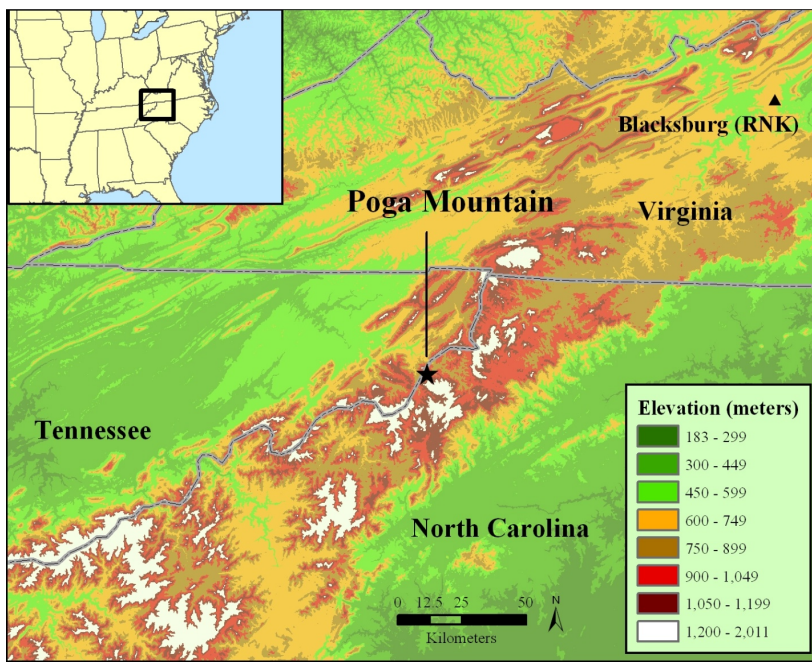
to automobile accidents. Prescribed fire operations need to be planned around the potential for visibility restrictions from smoke and fog. The Low Visibility Occurrence Risk Index uses the ADI mentioned above, and the forecasted relative humidity, to calculate the probable occurrence of visibility restricting fog or smoke, as derived from a study of automobile accidents in Florida. The lower the ADI (dispersion of smoke), and the higher the relative humidity, then the higher the LVORI will be, indicating a greater risk of low visibility. The LAVORI ranges from 1 to 10. ■

NWS and University Collaboration Tackles a Tough Forecast Problem

Laurence Lee
Science and Operations Officer

Providing accurate snow accumulation information is among the most difficult components of forecasting winter storms. One of the fundamental problems involved in forecasting snow accumulation is determining the liquid equivalent of the anticipated precipitation. The water content of snow varies considerably from event to event and even within a single event. The commonly used 10:1 ratio (10 inches of snow produced by one inch of water) is often not reliable.

During the past two winters a collaborative research project



The above map locates the study site at approximately 3730 ft above sea level.

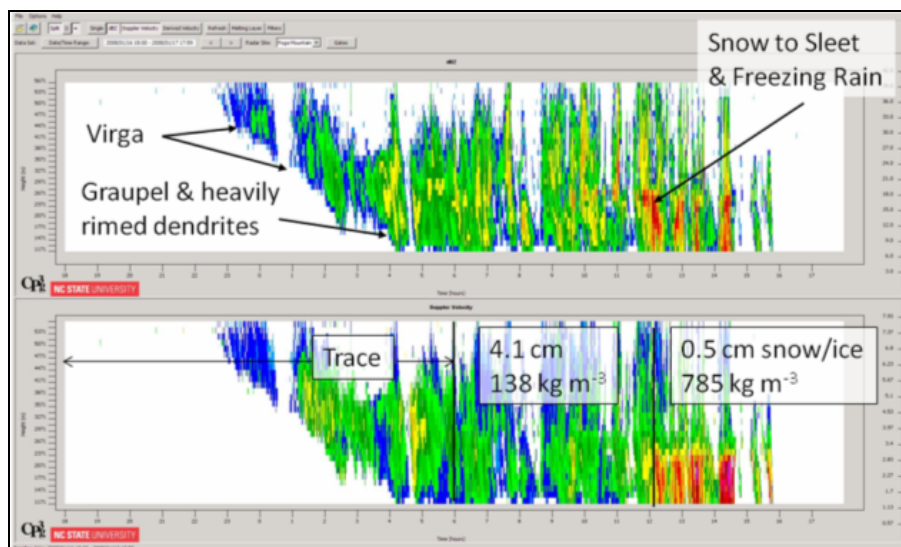


Figure 2: An example of the data collected by the vertically pointing MicroRainRadar (MRR) provided by Dr. Sandra Yuter's Cloud and Precipitation Processes and Patterns Group in the Department of Marine, Earth, and Atmospheric Sciences at North Carolina State University. Time moves from left to right and height increases from bottom to top. The colors represent different precipitation characteristics during the event on January 16-17, 2008. The descent of precipitation from clouds to the ground is clearly seen.

supported by the National Science Foundation and the UNC General Administration was conducted to obtain data to study the water content of snow in the southern Appalachians. The lead investigator was Dr. L. Baker Perry (Department of Geography and Planning at Appalachian State University). Dr. Douglas K. Miller (Department of Atmospheric Sciences at the University of North Carolina at Asheville), and Dr. Sandra E. Yuter (Department of Marine, Earth, and Atmospheric Sciences at North Carolina State University) were also key researchers. The National Weather Service (NWS) participants were Stephen Keighton and Laurence Lee, the Science and Operations Officers at the NWS

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Weather Forecast Offices at Blacksburg, Virginia, and Greer, South Carolina, respectively. During selected snow events (mostly northwest flow snow), meteorological observations were made at Poga Mountain in the Flat Springs community of northern Avery County, North Carolina. Data sources included snowfall and snow water equivalent, surface observations (temperature, humidity, wind, and pressure), upper-air observations from weather balloons, field observations of snow crystal morphology, and observations from a vertically pointing radar.

Results obtained so far from data analysis clearly demonstrate that the water content of snow at the study site varied considerably during the same event and also among events with similar weather patterns. The highest water content was observed with relatively warm surface temperatures and/or the presence of a near-freezing layer of air above the surface. Northwest flow snow events typically had lower water contents than other storm types. The information gathered

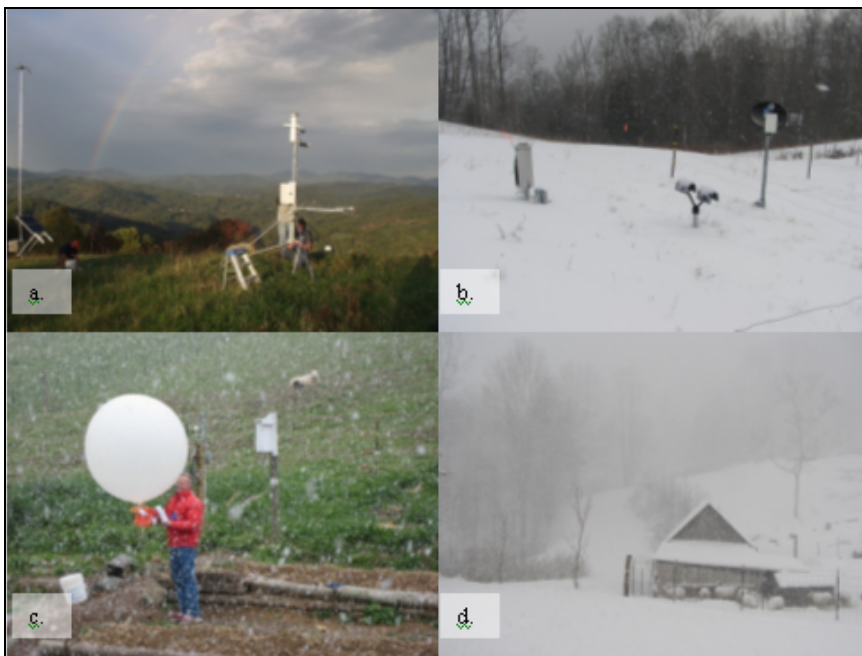


Figure 3: Instrumentation on Poga Mountain: a) Portable meteorological station near the crest at 3730 ft elevation; b) Pluvio weighing precipitation gauge, Parsivel disdrometer and present weather sensor, and vertically-pointing MicroRainRadar (left to right) at 3340 ft; c) Dr. Doug Miller preparing to launch a weather balloon on April 14, 2008; d) View toward the south southwest from the field site at 3340 ft during February 12, 2006 snow event.

from this project will provide forecasters with a more detailed understanding of regional snow climatology. Researchers and modelers can also use the data to fine-tune the numerical models that provide essential guidance in the forecast process. Continuing research on this topic will help the National Weather Service provide more timely and accurate forecasts of snow accumulation and a more accurate assessment of flood potential due to runoff from melted snow. ■

New Ways to Get Wireless Weather Information

Mike Jackson
Information Technology Officer

If you have an internet enabled portable device you can now receive your forecast, look at radar, and get hazardous weather information anytime, anywhere thanks to the National Weather Service's experimental Anytime/Anywhere

Forecast. If your mobile device supports http, point your browser to <http://mobile.weather.gov>. If your mobile device supports WAP, point your browser to cell.weather.gov

These pages are especially designed to fit on the small screens of portable devices.

You can now use your RSS reader to get National Weather Service watches, warnings and advisories. Just point your internet browser to <http://www.weather.gov/alerts/> and subscribe to the RSS feed you want. You can pick an entire state or you can select

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National Weather Service
Cell Phone (wap) URL: cell.weather.gov
Choose from the Following
Local Weather Information by: "City, St" or zip code <input type="text" value="29680"/> <input type="button" value="Go"/>
Watches, Warnings, Advisories by State / Marine Example: TX for Texas GM for Gulf of Mexico <input type="text"/> <input type="button" value="Go"/>
NWS Regional Radars Southern Central Eastern Western Pacific Alaskan Sectors

Figure 4: The mobile.weather.gov screen.

a specific county in the state. For those of you who use Firefox for your internet browser, you can select these to be "live bookmarks" that update with the latest information automatically.

The National Weather Service also now provides numerous KML files that can be viewed in Google Earth. Point your browser to <http://www.weather.gov/gis> and select the KML link. Here you can select from over 40 different KML feeds. These include current weather, forecasts, past weather, radar, satellite, fire weather and more. ▣

Another Active Spring and Summer for Severe Weather

Bryan McAvoy
Storm Data Focal Point

While drought conditions prevailed across much of the western Carolinas and northeast Georgia through the summer and early fall, there was still a considerable amount of severe weather across the region. A total of 512 severe events was recorded from April through September of 2008. Normally we see around 300 events during this time.

Fourteen tornadoes were reported, with six of those occurring as the remnants of

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Figure 5: One of the August 26th tornadoes crossing near Lake Hartwell, looking toward Clemson University. Picture courtesy Rob Harrison.

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Tropical Storm Fay affected the region on August 26th. The pictures to the right show Doppler radar signatures during the time that two of those tornadoes were on the ground. Where the “cool” and “warm” colors (green and red in this case) are side by side, this is called a tornado vortex signature. Such a radar signature strongly indicates a tornado. While you may think that these images are from the same tornado, the second image is actually from a tornado that formed 30 minutes after the first one, though it had a similar path.

At one point, the two tornadoes tracked within three miles of each other as they affected the Clemson area. Owing to the long lead time (see page 1) with the first

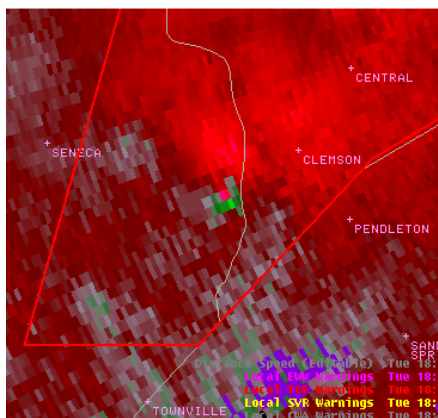


Figure 9: Storm relative velocity image from the first Clemson tornado at 2:50 pm EDT.

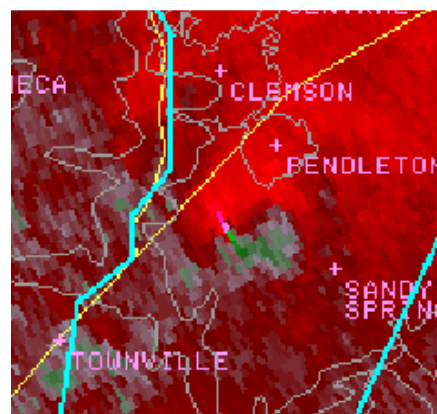


Figure 10: Storm relative velocity image from the second Clemson tornado at 3:40 pm EDT.

tornado, Clemson University was able to implement its emergency preparedness plan, getting many students to safety before the tornado affected the campus. In addition to tornadoes, the remnants of the tropical system also produced significant flash flooding in parts of the western Piedmont of North Carolina. Up to 10 inches of rain fell over parts of Mecklenburg, Cabarrus and Rowan counties, most of that during the morning hours on the 27th. So far flood damage estimates to homes and businesses total over 15 million dollars. ■

Working Toward a “Warn-on-Forecast” Approach

Harry Gerapetritus, Senior Forecaster
Jeff Taylor, Meteorologist Intern

Since the life cycle of a typical pulse-severe thunderstorm is often on the order of 30 minutes, significant improvements to warning lead-time will require incorporation of a “Warn-on-Forecast” concept. In some academic settings, very high resolution computer forecast models are now able to resolve weather on the scale of thunderstorms. However, the placement and intensity of the computer-generated thunderstorm activity is not sufficiently accurate at present to be used as a basis for warnings. While Doppler radar remains the primary tool in warning decision making, modeled and observed conditions of the “near-storm” environment are being increasingly used to determine which thunderstorms will produce large hail and damaging winds, and which will fade away

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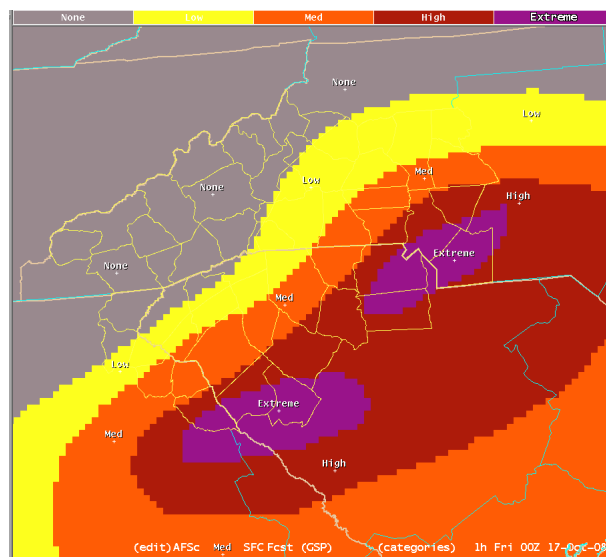


Figure 7: Atmospheric Favorability For Severe Storms.

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with a whimper.

Meteorologist Andy Roche of the National Weather Service in Charleston, West Virginia has developed a technique for highlighting locations and times with the greatest likelihood of experiencing severe weather. This technique, called "Atmospheric Favorability for Severe Storms" (AFS), has been implemented on an experimental basis at the National Weather Service in Greer, SC. The technique uses hourly computer model

forecasts of the basic ingredients for severe thunderstorms, such as low level convergence of the environmental wind field and instability, to produce a threat level grid for each hour of the day. A sample AFS grid is depicted in Figure 11.

Threat levels are indicated as either "None", "Low", "Medium", "High", or "Extreme" and can be based on a specific computer model or a composite of several models. Forecasters may choose to warn earlier in the storm cycle if a thunderstorm develops within a higher risk area, or to warn farther in advance of

strong thunderstorms moving from a lower risk to a higher risk region. A statistical study of the utility of AFS grids in enhancing warning operations is currently underway at the Greer forecast office.

Adding just a few minutes to warning lead-time can provide the public with enough opportunity to seek shelter when severe weather approaches. Atmospheric Favorability for Severe Storms, along with other Warn-on-Forecast initiatives, may help achieve this goal in the near future. ▣

NWS Point and Click Forecast Pages Enhanced with Google Earth

Neil Dixon
Webmaster

In October 2008, The National Weather Service (NWS) replaced the traditional maps used in the "Detailed Point Forecast" section of the Point and Click forecast pages with Google Earth maps. The Google Earth maps will enable the user to reference more communities, landmarks, and terrain features than the previous maps. In addition, the built-in pan and zoom features will allow quicker and easier navigation to additional forecast points.

Once the map is clicked, the page will generate a forecast from the NWS National Digital Forecast Database (NDFD). Currently, the forecasts are derived from NDFD using a 5 x 5 kilometer (3.1 x 3.1 mile)

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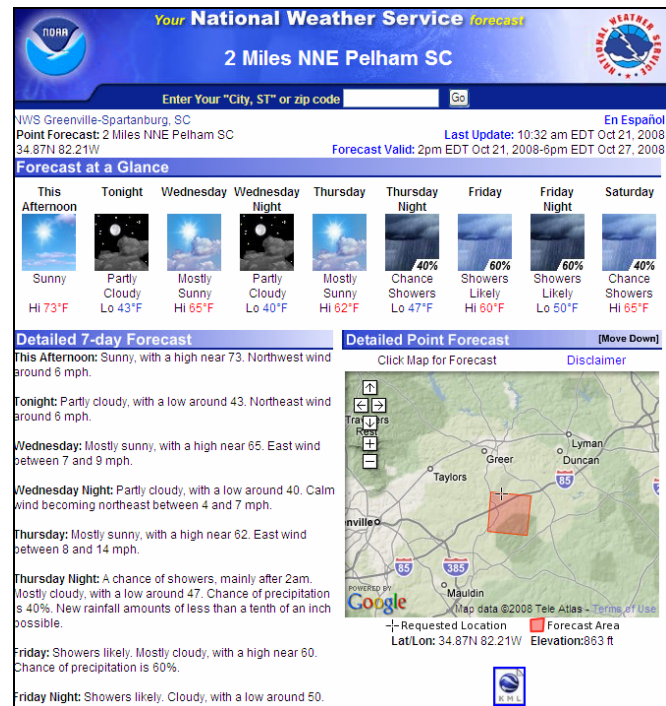


Figure 8: The Point and Click forecast page.

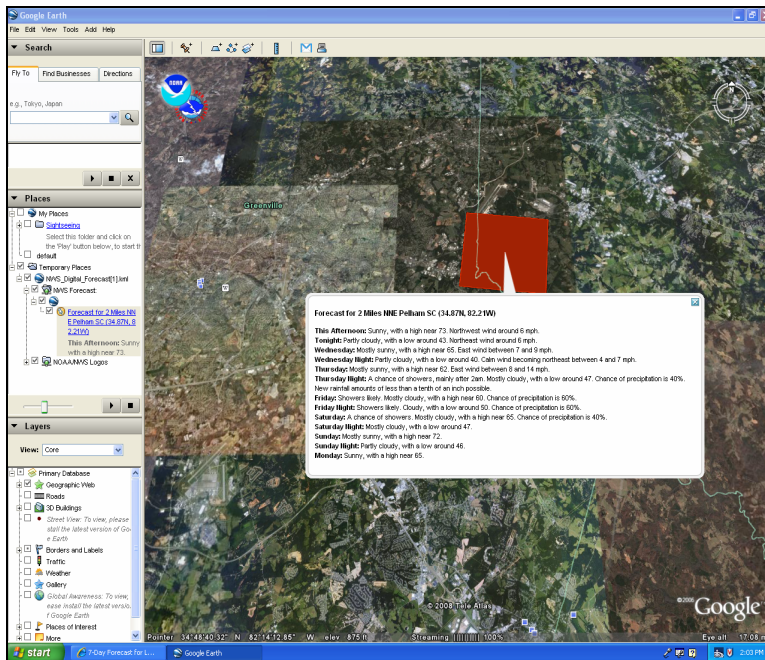


Figure 9: Point and Click forecast grid as seen in Google Earth.

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resolution, or forecast area. In figure 12, the forecast area is highlighted with a red box on the display.

The forecast is derived across the forecast area and will not change if another point is selected within the box.

Just below the map is an icon link for KML or Keyhole Markup Language. Selecting the KML link will launch Google Earth from the user's computer. Google Earth should look similar to the image in figure 13. The forecast can be viewed temporarily within Google Earth or saved under the Places menu for future reference. □

Please send any comments or questions to bryan.mcavoy@noaa.gov. We also encourage YOU to contribute to future issues.

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